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Cheng

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(54) **ELECTRICAL CONNECTOR ASSEMBLY WITH A FFC MODULE**

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H01R 12/24 (2006.01)

(52) **U.S. Cl.** **439/495**

(58) **Field of Classification Search** 439/495, 439/496, 492

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,684,183	A *	8/1987	Kinoshita et al.	439/77
6,159,038	A *	12/2000	Wu	439/495
6,319,052	B1 *	11/2001	Chang	439/495
6,379,161	B1	4/2002	Ma	
6,626,698	B2 *	9/2003	Matsumura	439/496
6,699,066	B2 *	3/2004	Wu	439/495
6,916,197	B1 *	7/2005	Wu	439/484
6,951,476	B1 *	10/2005	Saito et al.	439/495
7,140,909	B2 *	11/2006	Moritake	439/492
7,166,803	B2 *	1/2007	Sakurai et al.	439/496
7,238,040	B1 *	7/2007	Wu	439/352
2002/0142647	A1 *	10/2002	Aoki	439/496
2003/0013341	A1 *	1/2003	Urbaniak et al.	439/496

* cited by examiner

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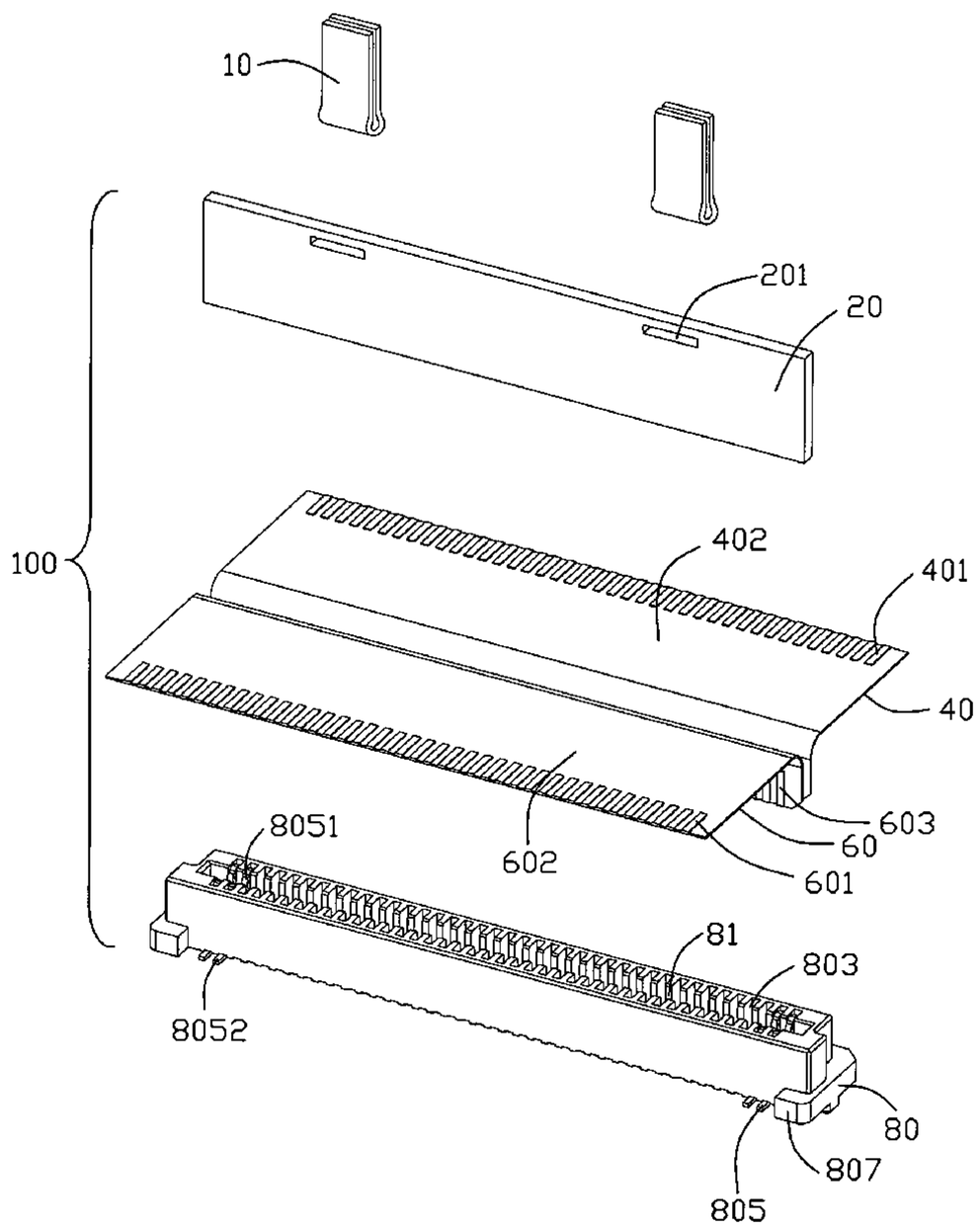
(57) **ABSTRACT**

An electrical connector assembly comprises an insulative housing defining a receiving cavity extending inwardly from a mating face thereof and a plurality of terminal receiving passages disposed in the insulative housing and in communication with the receiving cavity. A plurality of terminals are received into the corresponding terminal receiving passages. A FFC module defines a pair of FFCs with a pair of first mating portions at one end thereof and an insulative insert having a lower half section disposed between the pair of first mating portions. The FFC module has an inserting portion received into the receiving cavity of the insulative housing.

17 Claims, 5 Drawing Sheets



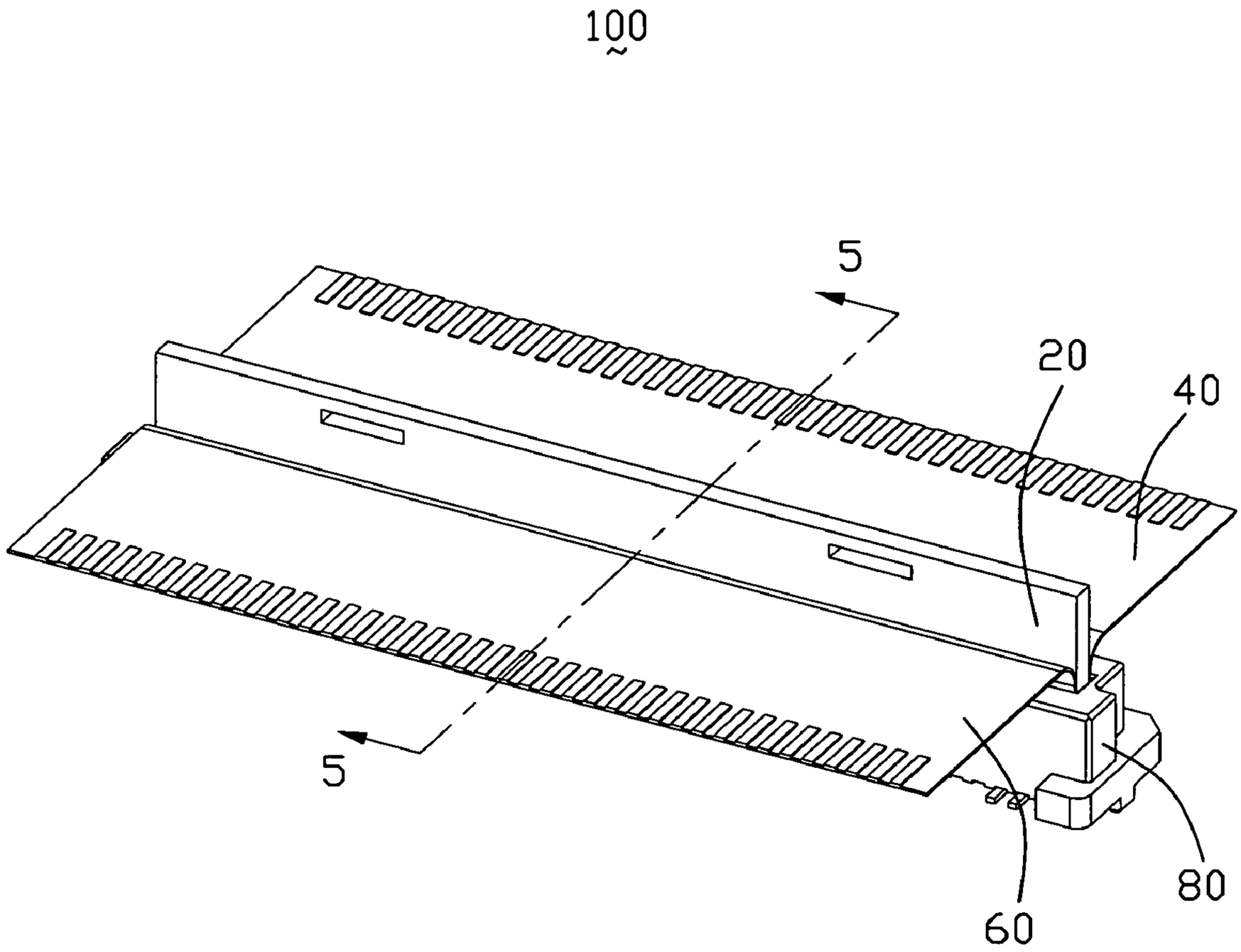


FIG. 1

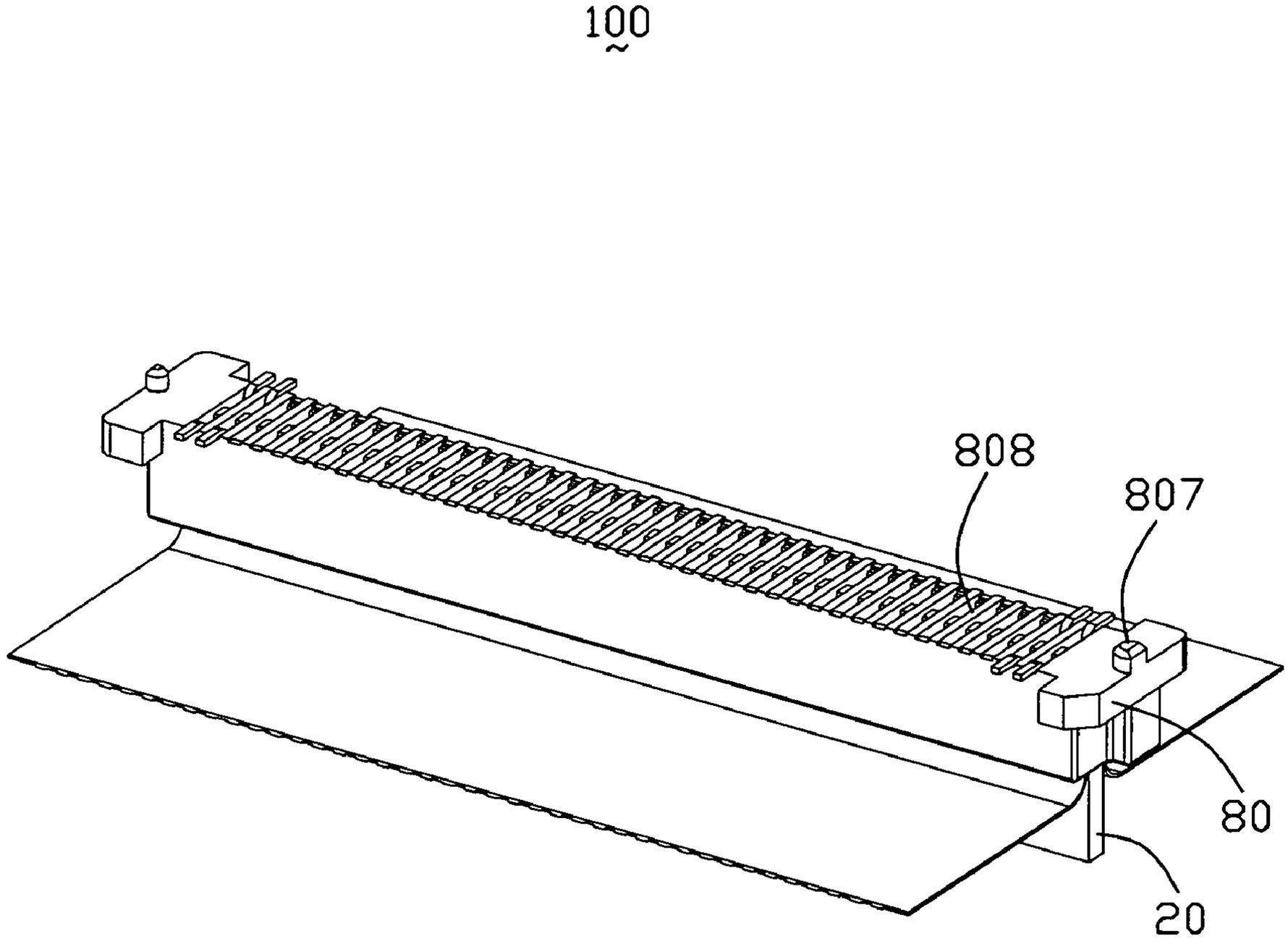


FIG. 2

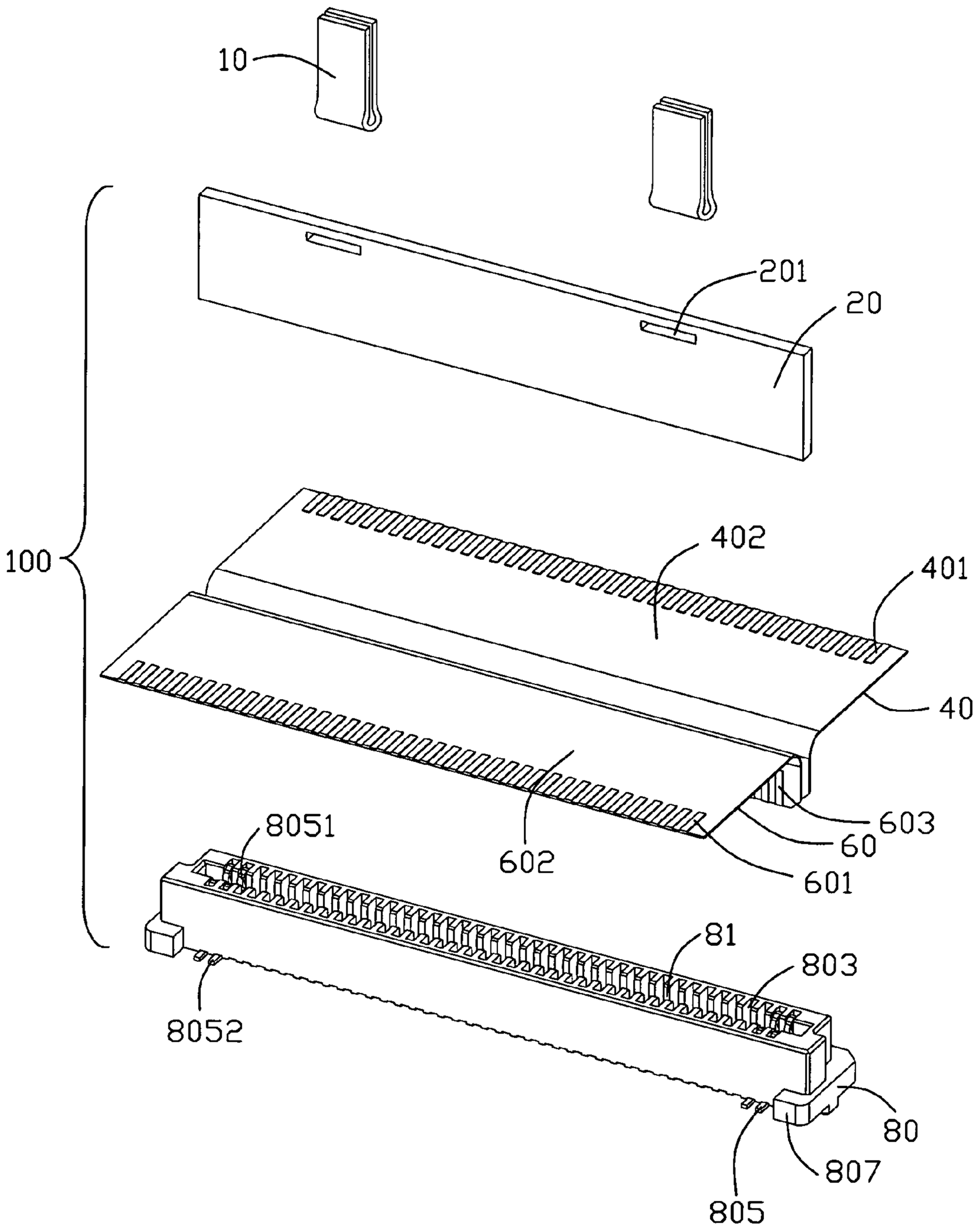

10
201
20
100
402
401
40
603
60
601
602
8051
81
803
8052
80
807
805

FIG. 3

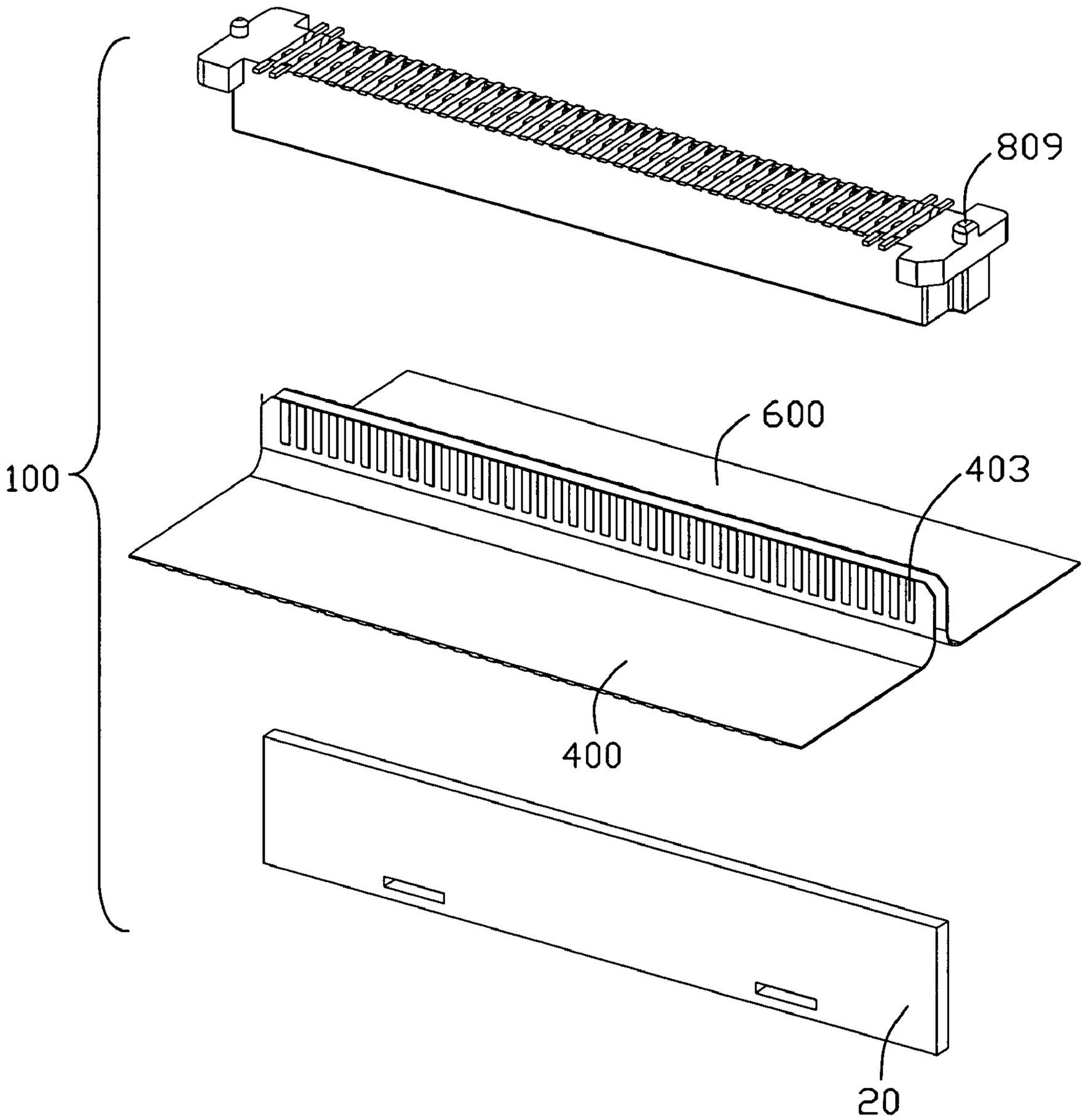


FIG. 4

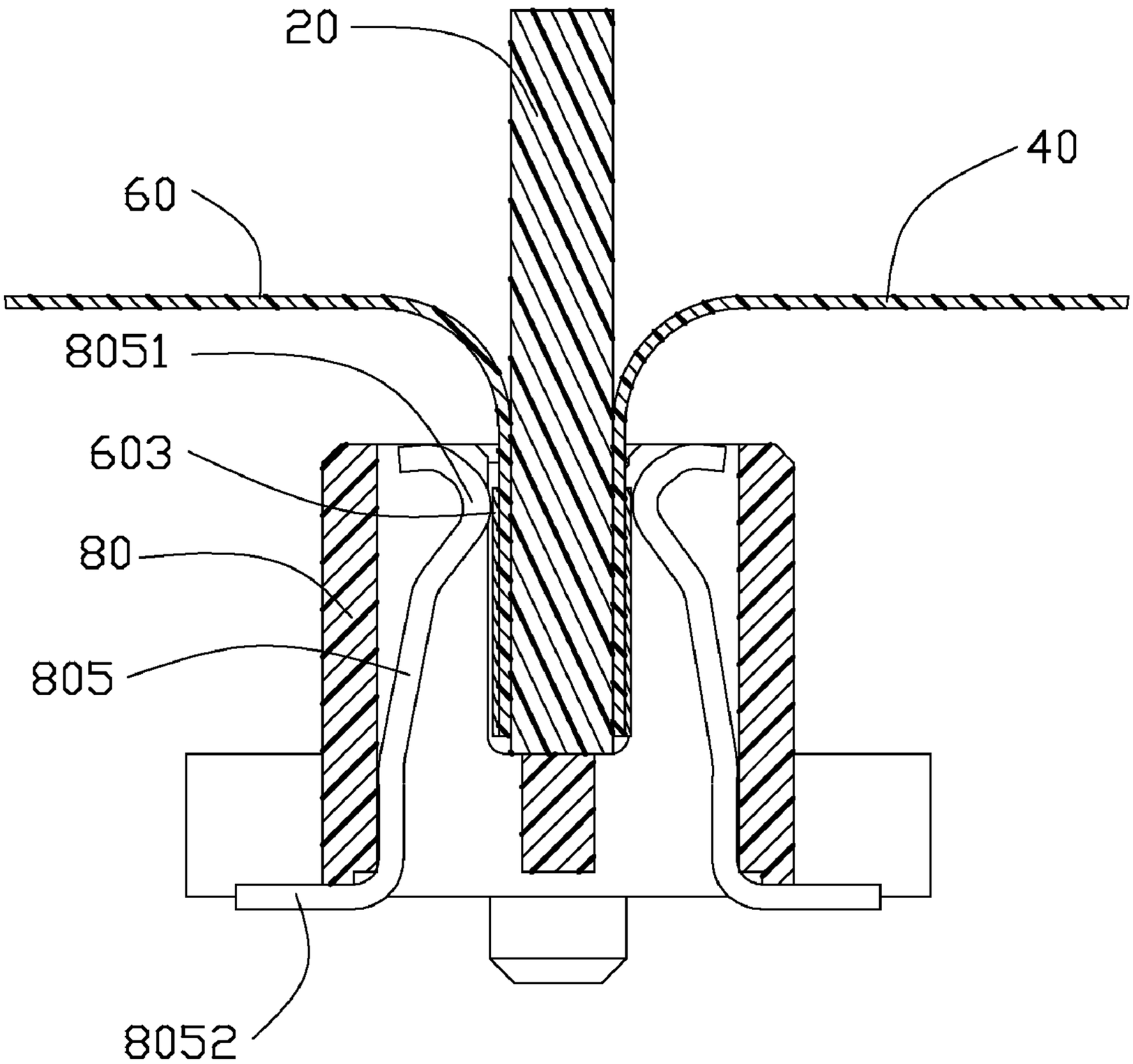


FIG. 5

ELECTRICAL CONNECTOR ASSEMBLY WITH A FFC MODULE

FIELD OF THE INVENTION

The present invention relates to an electrical connector assembly, and more particularly to an electrical connector assembly with a FFC module for mating with two complementary connectors.

DESCRIPTION OF PRIOR ART

Generally, electrical connectors, especially the board-to-board connectors are widely used in some electrical products, such as PC, Mobile phone, PDA etc. Electrically connecting between a pair of PCBs is through two board-to-board connectors, respectively mounted on the pair of PCBs, which are mating with each other. U.S. Pat. No. 6,379,161 B1 is issued to Ma (hereinafter referred to as Ma '161 Pat.) on Apr. 30, 2002 discloses a typical connector of this kind. Please referring to FIGS. 7 to 9 in the above mentioned patent, the Ma '161 Pat. discloses a board-to-board connector defining an insulative housing **20** and two rows of the contacts **12** disposed in the housing **20**. The insulative housing **20** defines a slot **22** extending inwardly form a mating face thereof for matably receiving a mating electrical connector or electronic component (not shown) therein. However, at some times, a board-to-board connector needs to mate with two mating electrical connectors or electronic components. So the traditional board to board connector can not meet the demands said above.

As discussed above, an improved electrical connector assembly overcoming the shortages of existing technology is needed.

SUMMARY OF THE INVENTION

Accordingly, an object of the present invention is to provide an electrical connector assembly integrally arranged with a FFC module for mating with two complementary connectors.

In order to achieve the above-mentioned objects, An electrical connector assembly comprises an insulative housing defining a receiving cavity extending inwardly from a mating face thereof and a plurality of terminal receiving passages disposed in the insulative housing and in communication with the receiving cavity. A plurality of terminals are received into the corresponding terminal receiving passages. A FFC module defines a pair of FFCs with a pair of first mating portions at one end thereof and an insulative insert having a lower half section disposed between the pair of first mating portions. The FFC module has an inserting portion received into the receiving cavity of the insulative housing.

Other objects, features and advantages of the invention will be apparent from the following detailed description taken in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of an electrical connector assembly in accordance with the present invention;

FIG. **2** is a perspective view of the electrical connector assembly in another point of view different from FIG. **1**;

FIG. **3** is an exploded, perspective view of the electrical connector assembly shown in FIG. **1** and a pull tape which can attach to the electrical connector assembly;

FIG. **4** is an exploded, perspective view of the electrical connector assembly shown in FIG. **2**; and

FIG. **5** is a cross section view of the electrical connector assembly of FIG. **1** taken along line **5-5**;

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Reference will now be made to the drawing figures to describe the present invention in detail.

Referring to FIGS. **1** to **4**, an electrical connector assembly **100** in accordance with the present invention includes a board-mount connector and a FFC module connected to the board-mount connector.

Referring to FIGS. **3** to **4**, the board-mount connector defines an insulative housing **80** and a plurality of terminals **805** disposed in the insulative housing **80**.

Referring to FIGS. **2** to **5**, the insulative housing **80** defines a mating face and a mounting face opposite to the mating face. A receiving cavity **81** extends inwardly from the mating face of the insulative housing **80**. The receiving cavity **81** is defined by a front wall, a rear wall and a pair of side walls connected with the front and rear wall. A plurality of terminal receiving passages **803** are defined in a pair of opposite inner faces of the front and rear walls and are in communicating with the receiving cavity **81**. A plurality of terminals **805** are arranged into two rows and respectively received into the terminal receiving passages **803**. The insulative housing **80** further defines a pair of base portions **807** disposed at two sides thereof and each has a bottom face aligning with the mounting face of the insulative housing **80**. Each base portion **807** defines a positioning post **809** extending downward from the bottom face thereof for positioning the electrical connector assembly **100** to the PCB (not shown in the Figs.). A plurality of slots (not labeled) are penetrating a mounting face of the insulative housing **80** and communicating with the receiving cavity **81**. The slots are spaced apart by a plurality of ribs **808** formed on the mounting face of the insulative housing **80**.

Referring to FIGS. **3** and **5**, a plurality of terminals **805** are inserted into the terminal receiving passages **803** of the insulative housing **80**. Each terminal **805** has a contacting portion **8051** and a soldering portion **8052** perpendicular to the contacting portion **8051**. Each contacting portion **8051** of the contact **805** is received into the terminal receiving passage **803**. Each soldering portion **8052** of the contact **805** extends out of the terminal receiving passage **803** and attaches to the mounting face of the insulative housing **80**.

Referring to FIGS. **1**, **3** and **4**, the FFC module **100** defines an insulative insert **20** and a pair of FFCs **40**, **60** respectively attached to two opposite sides of the insulative insert **20**.

The pair of FFCs **40**, **60** comprises a first FFC **40** and a second FFC **60** having a same structure with the first FFC **40**. Each FFC **40**, **60** defines a plurality of conductors arranged side by side, and insulating films laminated on the both sides of the conductors. The first and second FFCs **40**, **60** each has a first mating portion and a second mating portion at two ends thereof. The first and second FFCs **40**, **60** each has a first face **400**, **600** and a second face **402**, **602** opposite to the first face **400**, **600**. The first mating portion of the first FFC **40** has a plurality of first contacting sections **403** exposed the first face **400** of the first FFC **40**. The second mating portion of the first FFC **40** has a plurality of second contacting sections **401** exposed the second face **402** of the first FFC **40**. The first and second contacting sections **403**, **401** of the first FFC **40** are defined by two ends of the plurality of conductors of the first FFC **40**. The first mating portion of the second FFC **60** has a

plurality of first contacting sections **603** exposed the first face **600** of the second FFC **60**. The second mating portion of the second FFC **60** has a plurality of second contacting sections **601** exposed the second face **602** of the second FFC **60**. The first and second contacting section **603**, **601** of the second FFC **60** are defined by two ends of the plurality of conductors of the second FFC **60**.

The insulative insert **20** is formed of plastic material and defined by an upper half section with two holes **201** therein and a lower half section for supporting a pair first mating portions of the first and second FFCs **40**, **60**.

The first and second FFCs **40**, **60** are integrally attached to the insulative insert **20** through adhesive. A pair of second faces **402**, **602** of the first mating portions of the first and second FFCs **40**, **60** are respectively attached and adhered to the two sides of the insulative insert **20**. So the first contacting sections **403**, **603** of the first mating portions of the first and second FFCs **40**, **60** can contact with the contacting portions **8051** of the terminals **805**. And a pair of second mating portions of the first and second FFCs **40**, **60** can be used to mate with two complementary connectors. The FFC module defines an inserting portion formed by a pair of first mating portions of the first and second FFCs **40**, **60** and a lower half section of the insulative insert **20** and disposed at one end thereof.

Referring to FIG. **3**, a pull tape **10** can pass through the hole **201** to make the pull tape connected to the insulative insert **20**. The pull tape **10** is used to pull the FFC module out of the receiving cavity **81** of the insulative housing **80**. The first and second FFCs **40**, **60** can be bent to make the first mating portion thereof angled with the second mating portion thereof.

As the first and second FFCs **40**, **60** existed, the electrical connector assembly **100** can be connected with two complementary connectors. In addition, the first and second FFCs **40**, **60** can be bent arbitrary so that the connection between the electrical connector assembly **100** and two complementary connectors will be easy and convenient.

It will be understood that the invention may be embodied in other specific forms without departing from the spirit or central characteristics thereof. The present examples and embodiments, therefore, are to be considered in all respects as illustrative and not restrictive, and the invention is not to be limited to the details given herein.

What is claimed is:

1. An electrical connector assembly, comprising:

an insulative housing defining a receiving cavity extending inwardly from a mating face thereof and a plurality of terminal receiving passages disposed in the insulative housing and in communication with the receiving cavity;

a plurality of terminals received into the corresponding terminal receiving passages; and

a FFC module configured with a pair of FFCs with a pair of first mating portions at one end thereof and an insulative insert having a lower half section disposed between the pair of first mating portions, the FFC module having an inserting portion received into the receiving cavity of the insulative housing;

and the insulative insert further having an upper section extending to an exterior and having at least one hole therein for a pull tape passing through.

2. The electrical connector assembly as recited in claim **1**, wherein the first mating portions of the pair of FFCs are integrally adhered to the insulative insert.

3. The electrical connector assembly as recited in claim **1**, wherein each terminal defines a contacting portion disposed in the terminal receiving passage and a soldering portion extending out of the terminal receiving passage and perpendicular to the contacting portion.

4. The electrical connector assembly as recited in claim **1**, wherein the inserting portion is defined by a pair of mating portions of the pair of FFCs and the lower half section of the insulative insert.

5. The electrical connector assembly as recited in claim **4**, wherein each FFC defines a plurality of conductors arranged side by side, and insulating films laminated on the both sides of the conductors.

6. The electrical connector assembly as recited in claim **5**, wherein the inserting portion defines a plurality contacting sections exposed the insulating films and contacted with the terminals received into the insulative housing.

7. The electrical connector assembly as recited in claim **1**, wherein the pair of FFCs further has a pair of second mating portions at another end thereof for mating with two complementary connectors.

8. The electrical connector assembly as claimed in claim **7**, wherein the pair of second mating portions of the pair of FFCs are respectively angled with the pair of first mating portions of the pair of FFCs.

9. The electrical connector assembly as recited in claim **1**, wherein the insulative housing further defines a pair of base portions disposed at two sides thereof, each base portion defines a positioning post extending downwardly from a mounting face opposite to the mating face thereof.

10. The electrical connector assembly as recited in claim **9**, wherein a plurality of slots are penetrating a mounting face of the insulative housing and communicating with the receiving cavity.

11. The electrical connector assembly as recited in claim **10**, wherein the slots are spaced apart by a plurality of ribs formed on the mounting face of the insulative housing.

12. An electrical connector assembly, comprising:

an insulative housing defining a receiving cavity recessed inwardly from a mating face thereof and a plurality of terminal receiving passages communicated with the receiving cavity;

a plurality of terminals received into the corresponding terminal receiving passages;

a first and second FFCs both having a first mating portion received in the cavity, each first mating portion having a plurality of conductors exposed and contacted with a plurality of terminals;

an insulative insert having a portion received into the receiving cavity and disposed between the first mating portions of the first and second FFCs, and another portion opposite to said portion and not secured to the FFC but exposed to an exterior for easy operation; and

a pull tape secured to another portion of the insulative insert opposite to said portion.

13. The electrical connector assembly as recited in claim **12**, wherein the insulative insert further defines a portion having a hole therein for a pull tape passing through.

14. The electrical connector assembly as recited in claim **12**, wherein the first mating portions of the first and second FFCs are integrally adhered to the insulative insert.

15. The electrical connector assembly as recited in claim **14**, wherein each first and second FFC further has a second mating portion at another end thereof respectively for mating with a complementary connector.

16. An electrical connector assembly comprising:

an insulative housing defining an elongated slot extending along a lengthwise direction;

two rows of contacts disposed by two sides of the slot in the housing;

a pair of discrete flat flexible cables (FFCs) each having a front mating region, the front mating regions of said pair of FFCs associated with an insulator sandwiched therebetween, commonly received in the slot to mechanically and electrically engage the corresponding contacts in respective rows; wherein

a front edge region of the insulator is associatively secured between the pair of FFCs and is received in the slot while

a rear edge region of the insulator is exposed to an exterior and a pull tape is attached to the rear edge portion of the insulator for easy operation.

17. The electrical connector assembly as claimed in claim **16**, wherein said insulator, said connector and said pair of FFCs commonly defines cross like configuration in a view taken along the longitudinal direction.

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